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10/631,027	07/30/2003	Joel M. Dry	OPTOLUM-005	9520

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DONALD J. LENKSZUS  
PO BOX 3064  
CAREFREE, AZ 85377-3064

EXAMINER
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HO, TU TU V

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 07/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/631,027	Applicant(s) DRY, JOEL M.	
	Examiner Tu-Tu Ho	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 30 July 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-63 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>07/30/2003</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Objections*

- Each of **claims 15, 23, 36, 44, and 57** recites “said plurality of light emitting diodes” which is not clear. As best as can be understood, the respective emitting sources of each claim are light emitting diodes.

Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- Claims 1, 22, and 43** are rejected under 35 U.S.C. 102(b) as being anticipated by Stiles U.S. Patent 5,327,329 (the ‘329 patent).

The ‘329 patent discloses in Figures 2 and 3 and respective portions of the specification a device as claimed.

Referring to **claim 1**, the ‘329 patent discloses a light source comprising:

an elongate thermally conductive member 30 (“tube”) having an outer surface;

at least one solid state light source 22 (LED) carried on said elongate member outer surface;

one or more electrical conductors (not shown in figure 2, shown but not labeled in Figure 3) carried by said elongate thermally conductive member and connected to said at least one solid state light source to supply electrical power thereto; and

said elongate thermally conductive member being configured to conduct heat away from said at least one solid state light source to fluid contained by said elongate thermally conductive member.

Note that although the '329 patent does not explicitly disclose that elongate thermally conductive member 30 is configured to conduct heat away from solid state light sources 22 to fluid (air) contained by said elongate thermally conductive member, the reference discloses that elongate thermally conductive member, or tube, 30 is metal (column 4, line 20); therefore, in a sense, disclosing that elongate thermally conductive member 30 is configured to conduct heat away from solid state light sources 22 to fluid (air) contained by said elongate thermally conductive member, since it is known that metal conducts heat.

Referring to **claim 22**, the '329 patent discloses a radiation emitting source comprising:  
an elongate thermally conductive member 30 ("tube") having an outer surface;  
at least one radiation emitting semiconductor device 22 (LED) carried on said elongate member outer surface;

one or more electrical conductors (not shown in figure 2, shown but not labeled in Figure 3) carried by said elongate thermally conductive member and connected to said at least one radiation emitting semiconductor device to supply electrical power thereto; and

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said elongate thermally conductive member being configured to conduct heat away from said at least one radiation emitting semiconductor device to fluid contained by said elongate thermally conductive member.

Note that although the '329 patent does not explicitly disclose that elongate thermally conductive member 30 is configured to conduct heat away from radiation emitting semiconductor devices 22 to fluid (air) contained by said elongate thermally conductive member, the reference discloses that elongate thermally conductive member, or tube, 30 is metal (column 4, line 20); therefore, in a sense, disclosing that elongate thermally conductive member 30 is configured to conduct heat away from radiation emitting semiconductor devices 22 to fluid (air) contained by said elongate thermally conductive member, since it is known that metal conducts heat.

Referring to **claim 43**, the '329 patent discloses a radiation emitting source comprising:  
an elongate thermally conductive member 30 ("tube") having an outer surface;  
at least one radiation emitting solid-state device 22 (LED) carried on said elongate member outer surface;

one or more electrical conductors (not shown in figure 2, shown but not labeled in Figure 3) carried by said elongate thermally conductive member and connected to said at least one radiation emitting solid-state device to supply electrical power thereto; and

said elongate thermally conductive member being configured to conduct heat away from said at least one radiation emitting solid-state device to fluid contained by said elongate thermally conductive member.

Note that although the '329 patent does not explicitly disclose that elongate thermally conductive member 30 is configured to conduct heat away from radiation emitting solid-state devices 22 to fluid (air) contained by said elongate thermally conductive member, the reference discloses that elongate thermally conductive member, or tube, 30 is metal (column 4, line 20); therefore, in a sense, disclosing that elongate thermally conductive member 30 is configured to conduct heat away from radiation emitting solid-state devices 22 to fluid (air) contained by said elongate thermally conductive member, since it is known that metal conducts heat.

3. **Claims 1, 22, and 43** are rejected under 35 U.S.C. 102(b) as being anticipated by Ignatius U.S. Patent 5,660,461 (the '461 patent).

The '461 patent discloses in the figures and respective portions of the specification a device as claimed.

Referring to **claims 1, 22, and 33**, the '461 patent discloses a radiation emitting source comprising:

an elongate thermally conductive member (the array of Fig. 8, which comprises "bent lead frame substrates" depicted in Fig. 2, which are formed from "stamped lead frame substrates" depicted from Fig. 1, which substrates are made of metal or metal alloy such as copper, aluminum or nickel (paragraph bridging columns 2 and 3) ) having an outer surface ("outer" is interpreted as Located on the outside; external.<sup>1</sup>;

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at least one solid state light source, radiation emitting semiconductor device, or radiation emitting solid-state device 32 (Fig. 4 or Fig. 7) (“optoelectronic devices” or LED packages) carried on said elongate member outer surface;

one or more electrical conductors 1 (Fig. 4) carried by said elongate thermally conductive member and connected to said at least one solid state light source, radiation emitting semiconductor device, or radiation emitting solid-state device to supply electrical power thereto; and

said elongate thermally conductive member being configured to conduct heat away from said at least one solid state light source, radiation emitting semiconductor device, or radiation emitting solid-state device to fluid contained by said elongate thermally conductive member.

Note that although the ‘461 patent does not explicitly disclose that the elongate thermally conductive member is configured to conduct heat away from solid state light source, radiation emitting semiconductor device, or radiation emitting solid-state devices to fluid (air) contained (“contain” is interpreted as a. To have within; hold. b. To be capable of holding.<sup>2</sup>) by said elongate thermally conductive member, the reference discloses, as mentioned above, that elongate thermally conductive member is formed of metal or metal alloy such as copper, aluminum or nickel; therefore, in a sense, disclosing that elongate thermally conductive member is configured to conduct heat away from solid state light source, radiation emitting semiconductor device, or radiation emitting solid-state devices to fluid (air) contained by said elongate thermally

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conductive member, since it is known that metal or metal alloy such as copper, aluminum or nickel conducts heat.

4. **Claims 1-3, 5, 7, 17, 22-24, 26, 28, 38, 43-45, 47, 49, and 59** are rejected under 35 U.S.C. 102(e)(2) as being anticipated by Queentry U.S. Patent 6,152,491 (the '491 patent).

The '491 patent discloses in Figures 1-5 and respective portions of the specification a device as claimed.

Referring to **claim 1**, the '491 patent discloses a light source comprising:

an elongate thermally conductive member 12 ("internally hollowed, elongate and substantially cylindrical shaft 12 which is constructed of a strong, lightweight and resilient aluminum composite", column 3, lines 5-10) having an outer surface;

at least one solid-state light source 24 (LED elements, paragraph bridging column 1 and 2) carried on said elongate member outer surface;

one or more electrical conductors 70 (Fig. 2) or 84 (Fig. 4) carried by said elongate thermally conductive member and connected to said at least one solid-state light source to supply electrical power thereto; and

said elongate thermally conductive member being configured to conduct heat away from said at least one solid-state light source to fluid contained by said elongate thermally conductive member.

Note that although the '491 patent does not explicitly disclose that elongate thermally conductive member 12 is configured to conduct heat away from solid-state light sources to fluid (air) contained by said elongate thermally conductive member, the reference discloses that, as



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noted above, elongate thermally conductive member 12 is aluminum; therefore, in a sense, disclosing that elongate thermally conductive member 12 is configured to conduct heat away from solid-state light sources to fluid (air) contained by said elongate thermally conductive member, since it is known that aluminum conducts heat.

Regarding **claim 2**, the '491 patent discloses a light source comprising:

an elongate thermally conductive member 12 ("internally hollowed, elongate and substantially cylindrical shaft 12 which is constructed of a strong, lightweight and resilient aluminum composite", column 3, lines 5-10) having an outer surface;

a plurality of solid-state light source 24, 26,... (LED elements, paragraph bridging column 1 and 2) carried on said elongate member outer surface, at least some of said solid state light sources being disposed in a first plane and others of said solid state light sources being disposed in a second plane not coextensive with said first plane;

electrical conductors 84,... (Fig. 4) carried by said elongate thermally conductive member and connected to said plurality of solid-state light sources to supply electrical power thereto; and

said elongate thermally conductive member being configured to conduct heat away from said at least one solid-state light source to fluid contained by said elongate thermally conductive member.

Note that although the '491 patent does not explicitly disclose that elongate thermally conductive member 12 is configured to conduct heat away from solid-state light sources to fluid (air) contained by said elongate thermally conductive member, the reference discloses that, as noted above, elongate thermally conductive member 12 is aluminum; therefore, in a sense,

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disclosing that elongate thermally conductive member 12 is configured to conduct heat away from solid-state light sources to fluid (air) contained by said elongate thermally conductive member, since it is known that aluminum conducts heat.

By similar citations and explanations, and with reference to **claims 22-23 and 43-44**, the '491 patent discloses a radiation emitting source comprising a plurality of radiation emitting semiconductor devices and a plurality of radiation emitting solid-state devices as claimed. In particular, the reference discloses a radiation emitting source comprising:

- an elongate thermally conductive member 12 having an outer surface;

- a plurality of radiation emitting semiconductor devices 24, 26, ... or a plurality of radiation emitting solid-state devices 24, 26, ... carried on said elongate member outer surface, at least some of said radiation emitting semiconductor devices or said radiation emitting solid-state devices being disposed in a first plane and others of said radiation emitting semiconductor devices or said radiation emitting solid-state devices being disposed in a second plane not coextensive with said first plane;

- electrical conductors carried by said elongate thermally conductive member and connected to said radiation emitting semiconductor devices or said radiation emitting solid-state devices to supply electrical power thereto, said radiation emitting semiconductor devices or said radiation emitting solid-state devices being light emitting diodes; and

- said elongate thermally conductive member being configured to conduct heat away from said radiation emitting semiconductor devices or said radiation emitting solid-state devices to fluid contained by said elongate thermally conductive member.

Referring to **claims 3, 17, 24, 38, 45, and 59**, the internally hollowed, elongate and substantially cylindrical shaft 12 of the '491 patent inherently comprises air, which is a thermal transfer media, since the reference fails to disclose otherwise.

Referring to **claims 5, 26, and 47**, the internally hollowed, elongate and substantially cylindrical shaft 12 of the '491 patent comprises a tube.

Referring to **claims 7, 28, and 49**, the '491 patent further discloses in Figure 3 that said tube has a cross-section having flat portions.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. **Claims 4, 8-13, 18, 25, 29-34, 39, 46, 50-55, and 60** are rejected under 35 U.S.C. 103(a) as being unpatentable over the '491 patent for being obvious or in view of Kiraly et al. U.S. Patent Application Publication 2003/0174517 (the '517 publication).

Referring to **Claims 4, 8-10, 18, 25, 29-31, 39, 46, 50-52, and 60**, the '491 patent discloses a device as claimed and as detailed above including elongated thermally conductive member (aluminum tube) 12 carrying on its outer surface solid state high intensity light sources

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24, 26, ..., but fails to disclose that the elongated thermally conductive member 12 comprises heat dissipation protrusions or channels for thermal transfer.

However, change to the elongated thermally conductive member (aluminum tube) 12 to include heat dissipation protrusions or channels for thermal transfer would have been obvious for at least one of the following two reasons:

1) It is known that increasing surface of or adding channels to a thermal dissipating device would increase the thermal dissipating capabilities of the device and it is known that high intensity light sources would require some form of thermal dissipating. Hence it follows that, at the time the invention was made, one of ordinary skill in the art would recognize that adding protrusions or channels to the elongated thermally conductive member (aluminum tube) 12 would increase the surface area of the device and/or thermal dynamics, which in turn would increase the thermal dissipating capabilities of the device, which in turn would help with thermal dissipating of high intensity light sources - which would require some form of thermal dissipation - carried by the elongated thermally conductive member (aluminum tube) 12; and

2) The '517 publication, in disclosing an extensible linear light emitting diode illumination source comprising aluminum base 28, PCB base 10, and high intensity LED array 12, teaches that modifying aluminum base 28 to include extrusions ("extruded aluminum") would increase thermal dissipation ("for maximum heat dissipation") (paragraph [0034]) and to include channels (30) for cooling the illumination sources (12) (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the high-intensity-LED-carrying elongated thermally conductive member (aluminum tube) 12 of the '491 patent to include aluminum extrusions and channels. One would have been motivated

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to make such a modification in view of the suggestion in the '517 publication that aluminum base 28 including extrusions or channels would increase thermal dissipation.

Referring to **claims 6, 11-13, 27, 32-34, 48, and 53-55**, the elongate thermally conductive member 12 is a tubular member having a circular cross-section. Although the '491 patent fails to disclose that said tubular member has a polygon cross-section or a triangular cross-section, the various cross-section configurations are just different configurations one of ordinary skill in the art would find obvious for supplying elongate thermally conductive members, and therefore would not be patentable.

6. **Claims 14-16, 20-21, 35-37, 41-42, 56-58, and 62-63** are rejected under 35 U.S.C. 103(a) as being unpatentable over the '491 patent in view of Abtahi et al. U.S. Patent 5,890,794 (the '794 patent).

The '491 patent discloses a device as claimed and as detailed above including elongated thermally conductive cylindrical (aluminum "pipe") member 12 carrying electrical conductors 70, 84, ..., wherein the member 12 carries on its outer surface solid state high intensity light sources 24, 26, ..., but fails to disclose a flexible circuit/insulating layer carried on a surface of said elongate thermally conductive member. The reference in effect further fails to disclose that said flexible circuit/insulating layer comprises said electrical conductors. The '794 patent, in disclosing a lighting unit in Figs. 3 - 5, including elongated ("cylindrical") member 40 comprising elongated flexible printed circuit board 10, elongated housing 42, and LEDs 18, teaches that the use of printed circuit board takes advantage of mass production processes which have been developed for automatic placement of LEDS (and the inherent printed electrical

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conductors – “printed” - and the required apertures for receiving the LEDs) (column 2, lines 20-29) and that printed flexible circuit board 10, being flexible, can be wrapped around cylindrical housing 42 (Abstract, “the circuit board, being flexible, is wrapped around a cylindrical housing, with LED packages being directed radially outward”). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to change the simple pipe 2 of the device of the ‘491 patent to include a flexible printed circuit board/insulating layer wrapping around the pipe 2. One would have been motivated to make such a modification in view of the suggestion in the ‘794 patent that printed circuit boards allow utilization of mass production processes which have been developed for automatic placement of LEDS and that a flexible printed circuit board would allow utilization of mass-production-technique placement of LEDS on pipe 2 and around pipe 2.

### ***Double Patenting***

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-63 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 6,573,536. Although the

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conflicting claims are not identical, they are not patentably distinct from each other. Claims 1-63 of the present invention is a similar version of the claimed invention in claims 1-23 of the above-identified U.S. Patent with similar intended scope.

The rejection is based on the interpretation that LED is a solid-state light source, a radiation emitting semiconductor device, or a radiation emitting solid-state device.

***Allowable Subject Matter***

9. **Claims 19, 40, and 61**, insofar as being in compliance with the double-patenting rejection detailed above, are objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for the indication of allowable subject matter: The cited art, whether taken singularly or in combination, especially when all limitations are considered within the claimed specific combination, fails to teach or render obvious a device having all exclusive limitations as recited in claims 2/19 (claims 2 and 19), 23/40, and 44/61, characterized in all the common limitations of the claims.

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,492,725 to Loh et al. and assigned to Lemileds discloses an LED package.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (571) 272-1778. The examiner can normally be reached on 6:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.



Tu-Tu Ho  
June 24, 2004



David Nelms  
Supervisory Patent Examiner  
Technology Center 2800